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# **BNL-10 RUN**

## **FINAL REPORT**

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**BNL/NASA webpage:**  
**<http://www.bnl.gov/medical/NASA/NASA-home%20frame.htm>**

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## EXECUTIVE SUMMARY

During the summer of 2005, a team of physicists successfully completed approximately 144 hours of measurements with three ions at three energies each using the AGS complex. Four detection systems were used: a silicon stack (LBNL), silicon matrix (NASA-MSFC) and silicon strips (Univ. of Houston) measured charged particles at a range of angles around the beam axis; a set of scintillation counters (LBNL) measured neutrons at four different angles. Targets included several thin elemental targets for fragmentation cross section measurements and thick materials for charged particle transport studies. A parasite measurement (Eril Research/Oklahoma State Univ.) used plastic nuclear track detectors to measure charged particle production in lunar and Martian regolith simulant and water. At the present time, the raw data from the active charged particle and neutron detectors are archived, awaiting a decision by NASA on whether to fund the data analysis

Five four institutions from the United States were represented, totaling 12 users. Several double differential cross-section were measured at AGS, employing 290.75 hours of beam time (144.25 hours for physics experiments) delivered in a three-weeks period. In addition, 104.12 hours were used for machine setup and, 19.85 hours for experimenter set-up and dosimetry. A total of 22.52 hours of beam time were lost due to accelerator related problems. During BNL-10, AGS provided iron (3, 5 and 10 GeV/nucleon), silicon (3, 5 and 10 GeV/nucleon) and carbon (3, 5 and 10 GeV/nucleon) beams for physics experiments.

## **BNL-10 PARTICIPANTS**

<b>Exp.</b>	<b>Participants</b>	<b>Affiliation</b>	<b>Title</b>
N-143	<b>J. Miller</b>	LBNL, Berkeley, CA	Ph.D, Principal Investigator
	C. Zeitlin	“	Ph.D., Co-Worker
	L. Heilbronn	“	Ph.D., Co-Worker
	S. Guetersloh	“	Ph.D., Co-Worker
	E. Benton	Eril/OSU	Ph.D., Co-Worker
	W. Fountain	NASA-MSFC	Ph.D., Co-Worker
	E. Kuznetsov	“	Ph.D., Co-Worker
	L. Pinsky	University of Houston, TX	Ph.D., Co-Worker
	B. Mayes,	“	Ph.D., Co-Worker
	M. LeBourgeois	“	Ph.D., Co-Worker
	N. El Khayari	“	Ph.D., Co-Worker
	D. Lazarus	BNL, Upton, NY	Ph.D., Co-Worker

## **PARTICIPANT INSTITUTIONS**

### **NASA related centers/institutes (1)**

- NASA Marshall Space Center, VA

### **National Laboratories/Institutes (2)**

- Brookhaven National Laboratory, NY
- Lawrence Berkeley National Laboratory, CA

### **Universities (1)**

- University of Houston, TX

### **Private Institutions (1)**

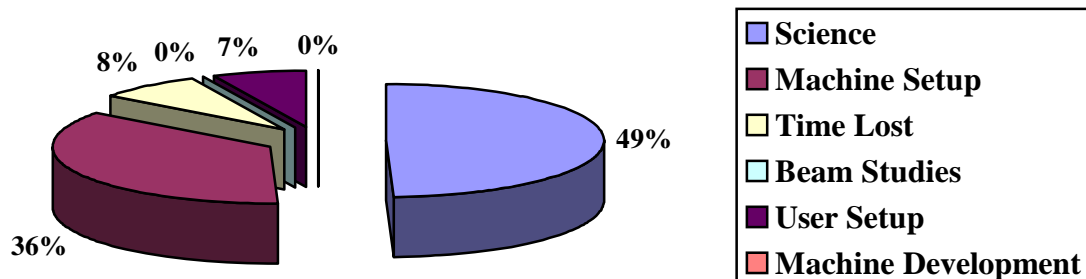
- ERIL Research Inc., CA

## **RUN TIME DESCRIPTION (hours)**

<b>Dates</b>	<b>06/21/05/2 to 06/28/05/1</b>	<b>06/28/05/2 to 07/06/05/1</b>	<b>07/06/05/2 to 07/10/05/1</b>	<b>Total</b>
<b>science</b>	<b>0</b>	<b>86.5</b>	<b>57.76</b>	<b>144.26</b>
<b>machine development</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>beam studies</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>machine setup</b>	<b>8</b>	<b>71.8</b>	<b>24.32</b>	<b>104.12</b>
<b>experimenter setup</b>	<b>0</b>	<b>12.6</b>	<b>7.25</b>	<b>19.85</b>
<b>failure</b>	<b>0</b>	<b>21.1</b>	<b>1.42</b>	<b>22.52</b>
<b>Totals</b>	<b>8</b>	<b>192</b>	<b>90.75</b>	<b>290.75</b>

## DESCRIPTIVE STATISTICS

### Total BNL-10 Stats:



## BNL-10 BEAM CHARACTERISTICS

Ion	Kinetic Energy (GeV/n)
$^{12}\text{C}$	3
	5
	10
$^{28}\text{Si}$	3
	5
	10
$^{56}\text{Fe}$	3
	5
	10

## BNL-10 PARTICIPANT, EXPERIMENTAL SAMPLES AND ENDPOINTS

Exp.	Participants	Samples	Endpoints
N-143	A Dedicated Run at the AGS <b>J. Miller (PI)</b>	Silicon stack (LBNL), Silicon matrix (NASA-MSFC) Silicon strips (Univ. of Houston) Scintillation counters (LBNL)	1) double differential cross sections (angle and energy or momentum) of heavy fragments ( $A > 4$ ); 2) double differential cross sections (energy and angle) of light ions ( $Z=1$ and $2$ ); and 3) double differential cross sections (energy and angle) of secondary neutrons.